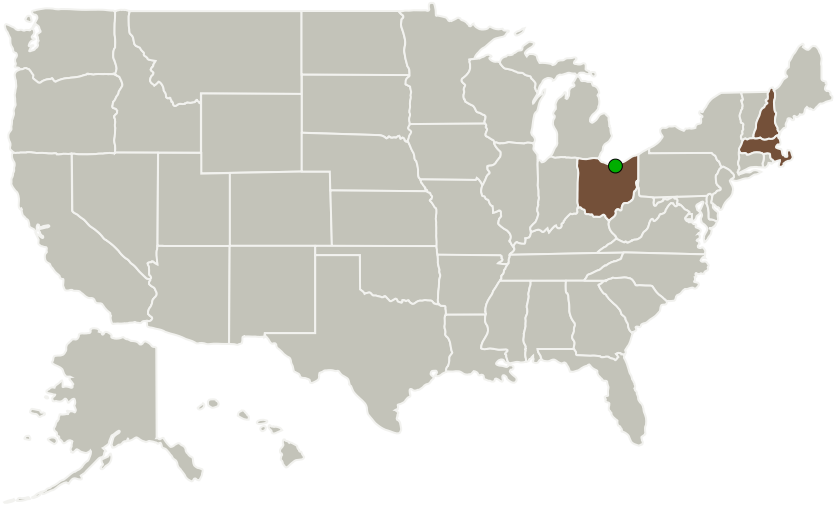
Advanced Radiative Emitters for Radioisotope Thermophotovoltaic Power Systems, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

Radioisotope Power Systems (RPS) are critical for future space and planetary exploration missions. Small improvements in the RPS performance, weight, size, and/or reliability can have a dramatic effect on the scientific capability of the vehicle and the overall mission costs. Radioisotope thermophotovoltaic (RTPV) energy converters are a particular type of RPS that directly convert the heat produced by a general purpose heat source to electrical power using a specialized photovoltaic (PV) cell. A key element in an RTPV system is the radiative emitter that converts thermal energy to radiative energy that illuminates the PV cell. In this project, Creare and the Massachusetts Institute of Technology (MIT) propose further development of an advanced, 2-D, photonic crystal radiative emitter optimized for RTPV systems that provides high emittance matched to the bandgap of the PV cell with low emittance elsewhere that will provide high system efficiency. In Phase I, we designed, fabricated, and tested prototype emitters. In Phase II, we will improve and scale up the fabrication processes, and fabricate larger, improved test samples, which will be fully characterized for high-temperature emittance and durability. We will also assess the impact of this new emitter on the overall RTPV system design and performance.

Primary U.S. Work Locations and Key Partners



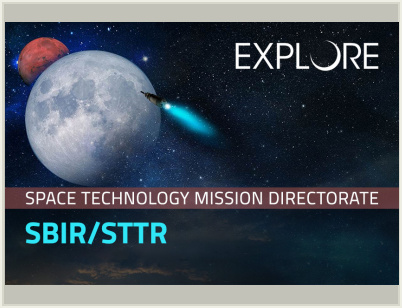


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Table of Contents

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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
Massachusetts Institute of Technology(MIT)	Supporting Organization	Academia	Cambridge, Massachusetts

Primary U.S. Work Locations	
Massachusetts	New Hampshire
Ohio	

Project Transitions

July 2010: Project Start

October 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138798)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

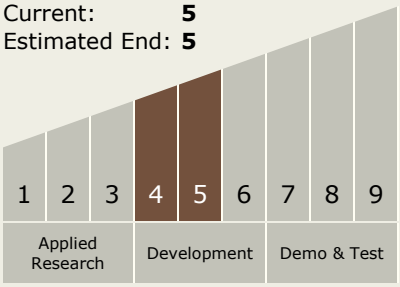
Carlos Torrez

Principal Investigator:

Richard W Kaszeta

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.2 Heat Sources

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System